National Aeronautics and Space Administration

Purge System and Hazardous Gas Detection System

Glenn Research Center is designing the purge system and hazardous gas leak detection system for the Ares I Crew Launch Vehicle Upper Stage. The purge system operates in the instrument unit, the aft skirt, and interstage compartments. It also provides a purge to the system tunnel, hydrogen pressurization tunnel, liquid hydrogen fill and drain fairing, and the liquid hydrogen feed line fairing.

The purpose of the purge system is to provide a noncombustible, thermally conditioned environment to upper stage compartments prior to launch. The purge system also provides directed cooling flow toward various avionics boxes and subsystems.

The purpose of the hazardous gas leak detection system is to detect hydrogen and oxygen gases in the upper stage compartment volumes prior to launch and ensure hazardous levels are not attained. Hazardous gas is sampled at the instrument unit vent locations, aft skirt thermal blanket opening, and interstage vent locations. The detection system uses open-ended tubes to transport gas samples to ground-based analyzers.

The ground system includes a vacuum system to pull the gas samples from the flight vehicle and mass spectrometers to perform the gas analysis.

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ARES I CREW LAUNCH VEHICLE UPPER STAGE